DOCUMENT RESUME

ED 028 813 PS 001 650

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Current Issues in Research on Early Development.

Pub Date 31 Aug 68

Note-9p.; Paper presented at the Raymond G. Kuhlen Memorial Symposium, "Elements of a Life Span Psychology," Stanford University, Stanford, Calif., August 31, 1968

EDRS Price MF-$0.25 HC-$0.55

Descriptors-*Biological Influences, *Child Development, *Developmental Psychology, Early Childhood, Early Experience, Physiology, *Review (Reexamination), Scientific Research

Identifiers-Erik Erikson, Piaget, Raymond G. Kuhlen

Research on early development is moving apace. Developmental psychology is again giving serious attention to ages and stages. This attention is due, in great part, to the formulations about cognitive development by Piaget. Earlier in the century, the experimental approach to child study came to reflect psychology's generally heavy commitment to physics and chemistry. Lately, however, the influence of biology on developmental psychology has become predominant. Examples of this interaction include (1) the study of ethology (particularly of the child's early ties to other human beings, especially to the caretaking person); (2) the investigations in evolutionary biology (the effect that the naturalistic field studies of nonhuman primates have on the naturalistic study of human primates); (3) the new uses of karyotyping, (looking at the genetic characteristics of the newborn); (4) the link between psychology and physiology; and (5) the use of electroencephalographic data to study brain behavior relationships. (WD)

ED028813.

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Paper for

THE RAYMOND G. KUHLEN MEMORIAL SYMPOSIUM: ELEMENTS OF A LIFE SPAN PSYCHOLOGY

Current Issues in Research on Early Development

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Saturday, August 31, 1968

PS001650

Co-chairmen: James E. Birren, University of Southern California

Marjorie P. Honzik, University of California, Berkeley

Co-sponsored by Divisions 7 and 20

Other participants:

Lawrence Kohlberg, Harvard University. Development and change in moral character and behavior over the life span.

Rolf H. Monge, Syracuse University. Learning in the adult years: set or rigidity.

Bernice L. Neugarten, University of Chicago. Continuity of psychological issues into adult life.

There are many psychologists who admired Ray Kuhlen from afar, and I am one of them. I met him only once, on a visit to Syracuse University, and on that occasion I enjoyed his hospitality and personal kindness. From afar, over the years, I admired his devotion to developmental and educational psychology, his influential writing, and his effective work as Editor of the Journal of Educational Psychology. Because I subsequently became editor of an allied journal, Child Development, I am in an especially good position to appreciate what Ray did as an editor. He put out a journal of high quality and with a broad topical coverage. Some of the excellence of the writing in that journal is the result of his patient work with a blue pencil. And his journal had the shortest publication lag of any publication in the APA's stable. I am very glad to have the opportunity to participate in this symposium which expresses the gratitude and esteem that we all feel for Professor Kuhlen. He was concerned with human development throughout life. My assignment today is to discuss early development and some of the current issues in research concerning it. That is a big order, my time is brief, and I hope you will understand that my coverage must be selective.

In its early years, developmental psychology was preoccupied with ages and stages. Investigations sought to learn the typical age at which various stages of development occurred. This work was influenced by the biology of its time, with the notion of the progressive unfolding of the phenotype as an expression of the fixed underlying genotype. The behaviors that were chosen for study were those that were thought to be species-specific and especially significant for human evolutionary adaptation, such as upright locomotion, prehension with the famous apposable thumb, and speech. Each child was seen as a representative of the human species. From some of the popularized ideas of the biology of the time there also came some startling ideas about evolution, including some far-fetched notions about the way ontogeny recapitulates phylogeny in social

and moral development of the human child.

As these studies progressed, investigators became impressed with the diversity of developmental courses and with the wide range of ages at which particular stages occurred. This led developmental psychology to a focus on individual differences, echoing one of the great themes of American psychology. There developed a search for the sources of variance. In that search, one path led to the study of events in the child's immediate environment that influence his performance, and thus there developed an experimental psychology of child development. Another path on the search for sources of individual differences led to the study of events in the child's history that account for his particular ways of performing, and thus there developed a psychology of socialization.

The experimental approach to child study came to reflect psychology's generally heavy commitment to the models of science represented by physics and chemistry. Although Pavlov was himself a biologist, his work influenced American psychology at a time that physics and chemistry were the brightest stars in the scientific firmament, and it is hardly surprising that American psychologists conceptualized conditioning and learning in a way that sounded more like physics than like biology. The study of socialization, on the other hand, leaned on methods developed in the child guidance clinic--projective techniques, the interview, naturalistic observation--and on the methods of sociology and anthropology. Biology became less influential as a source field for developmental psychology.

In the past decade or two, however, biology has moved to the center of the scientific stage. Physics and chemistry are still stars, but often they find themselves playing supporting roles. The best lines are being spoken now by the biochemists and the geneticists. The molecular biologists are today's luminaries.

In my own view of the field, I note that developmental psychology is once again drawing heavily on biology, and I think this is both appropriate and wise, in view of the rapid advances in the biological sciences.

Biology today is a very different science from the one that informed the work of G. Stanley Hall, Arnold Gesell, and the generation that followed them. But the notion of stages and sequences has not disappeared from it, nor from our work deriving from biological thinking. Piaget is unquestionably the most influential developmental psychologist of our time--his impact is evident equally in our theories and in our experiments. I remind you that Piaget was educated as a natural scientist, his initial papers were in zoology, and the central notion in his thinking is the notion of adaptation. His thinking has revitalized our interest in ages and stages, and Professor Kohlberg's work that will be discussed today is one example of this revitalization.

Another strong tradition of theorizing about development, that stemming from Freud and represented most vividly today in the writings of Erik Erikson, is also a theory about stages and sequences. Erikson uses the vocabulary of embryology, and his mentor was a physician trained in the biology of his time, so again we are speaking of links between biology and psychology. We read Erikson's work with fascination at his eloquence and with a sense of being enlightened by his observations and formulations. Therefore it has been especially disappointing that so little empirical investigation has stemmed from Erikson's work. In this it stands in doleful contrast to Piaget's.

My own opinion is that at present we lack the methods for any useful investigation of Erikson's approach. His observations derive from interviews and from projective techniques, but methodological research on these methods has led us to question the usefulness of data from them for research purposes.

The work of Robbins, Haggard and Brekstad, Wenar, Mednick, Radke-Yarrow, Burton, and Campbell; all of them following up on the early work of Herbert Stolz, Honzik, and MacFarlane; has led us to have serious doubts about the information yielded by retrospective interviews. We have learned how heavily interview data are burdened by response styles, respondent sets--including acquiescence and conformity--retrospective errors of omission and distortion, and the like. I find the methodological work on projective techniques less convincing than the work I have cited on the parent interview. I am unimpressed by the finding that projective data do not correspond to data from interviews and field observations, since I believe projective techniques were devised precisely in order to get at information not revealed by observation or interview. Still, I am not surprised that projective techniques are used hardly at all in contemporary developmental psychology, for I sympathize with investigators who have been perplexed by questions about the reliability of projective data and about cross-case comparability of interpretation.

But I do not wish to spend any more time calling your attention to the widespread interest among psychologists in the cognitive development of the young child nor to the fact that research inspired by psychoanalytic formulations is at a standstill. Both of these trends are evident to the most casual readers of our journals and textbooks. Rather, I wish to mention certain other lines of approach that also reflect our debt to biology, fields that seem to me to hold much promise for the immediate future.

One link between developmental psychology and biology is in the study of attachment, as represented in the work of Ainsworth, Rheingold, Bowlby, Harlow, and others. This work is heavily influenced not only by the theories of the European ethologists but also by their methods. We might say that it represents a sophisticated approach to what has been called "imprinting," or we might say

that it represents an analog of the notion of imprinting in more sophisticated species. In any case, ethology has inspired a new look at the child's early ties to other human beings, and especially to the caretaking person.

Another link is evident in the stimulating effect that the naturalistic field studies of non-human primates have had on our naturalistic study of human primates. Investigators like Washburn, DeVore, Jay, Goodall, Schaller, and others have pioneered in observations of baboons, lemurs, rhesus macaques, and gorillas in their natural habitats. This work is an effort to investigate the role of social behavior in species adaptation, just as earlier there had been anatomical investigations of the role of morphological structure in species adaptation. Their reports about behavior in infancy and the juvenile period in these species have set us to observing our own species with new eyes. In my judgment, these new observations will prove especially provocative when they are linked to social learning theory, with its current emphasis on observational learning and imitation of models.

A third link between developmental psychology and the newer biology has become possible because of the emergence of precise and efficient methods of karyotyping. From blood drawn on the first day of postnatal life, it is now possible to establish before an infant leaves the hospital whether or not he is a victim of various chromosome anomalies. Broad surveys of newborns are now being conducted in Boston, Denver, and elsewhere. They enable investigators to single out at birth those humans who are destined later to exhibit symptoms which will cause them to be diagnosed in adolescence or early adulthood as victims of Klinefelter's Syndrome, Turner's Syndrome, and so forth. That is, no longer must we await the development of the phenotype to know which individuals are sexually anomalous. Now at birth we can identify the XXY, the person who

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will be phenotypically male but sterile, with testicular atrophy. This is Klinefelter's syndrome, a relatively common disorder. We can identify the XO, the person who will be phenotypically female but sterile, a victim of Turner's syndrome. We can identify true hermaphrodism, XX, and also at birth we can identify the rare condition which has recently excited much interest in the popular press, "hypermasculinity" or XYY. This new technology provides an exciting opportunity to test our standard theories of sex-role learning. At present we emphasize the child's assigned gender, his so-called "sex of rearing," which has appeared to be critical to the development of masculinity and femininity because of the expectations which other persons level on the child and because of the selective reinforcements they provide. Cases of Klinefelter's and Turner's syndrome provide a natural experiment to test this emphasis in our current theories, because these individuals will have a clear-cut assigned sex of rearing. Their genotypical deviations from true masculinity or true femininity will not become evident to their parents or peers for many years, until long after socialization pressures have had time to "take." Walzer is following this natural experiment in a longitudinal study at Harvard, and his data on children who have an unambiguous assigned sex but who are genetically not fully sexed should shed new light on the interaction between nature and nurture.

Karyotyping methods also enable identification at birth of children who suffer from other genetic disorders, including various diseases in which mental retardation is a prominent symptom. Thus these methods also have implications for the longitudinal study of intellectual development.

I have spoken about links between developmental psychology and ethology, evolutionary biology, and genetics. Yet another link, the fourth I wish to mention, is to physiology and physiological psychology. It constitutes another instance

of enrichment of our field by advances in a biological science. I refer to the studies of individual differences in neonates. Today many investigators are looking for stable early individual differences in autonomic function (including respiration and cardiac function), in behavioral vigor, in state of arousal, and the like. They are searching for precursors of later personality traits. They are looking for physiological characteristics that may constitute vulnerability to certain psychosomatic stresses. They also wish to identify what the infant brings initially to the mother-infant interaction. This work, by Bell, Bridger, Stechler, Korner, Kagan, Lipton, Steinschneider, Richmond, Lodge, Graham, and many others, uses the methods of physiological psychology. It promises to have profound implications for our understanding of socialization and personality development.

One of the principal topics in the study of brain and behavior today is the topic of sleep. As you know, sleep is "in." Many investigators are studying its physiology and phenomenology, using electroencephalographic and observational methods. One focus of their work is developmental, attempting to explicate the observation that REM sleep occupies more of the newborn infant's day than it does the time of older children or adults. There are pronounced age trends in sleep time and in REM time, and study of these trends may help to explain what the neurophysiological function of sleep is. Child psychologists in the past have restricted their work with the child to his waking hours, and have regarded sleep as a nuisance rather than a phenomenon to be studied. Now is the time to change our ways. New techniques are available, simply awaiting our use, and sketchy developmental observations already exist, in the work of Dement, Roffwarg, Emde, and others. It is worth noting that today sleep disturbances are among the commonest signs of emotional disturbance in childhood. In the past, we have

learned that studying the symptoms characteristic of any developmental period can enhance our understanding of healthy development during that period; sleep and its disturbances may merit our attention on this account.

Any survey of the impact of the biological sciences on our field must mention the attention we are giving to the research on early experiences and later outcomes in animals. Many of our theories about environmental enrichment, early intellectual stimulation, maternal deprivation, and the like, have been heavily influenced by research on animals (especially rats, mice, and dogs) on the effects of early handling, early gentling, early stress, early isolation, early social impoverishment, early perceptual deprivation, etc. I refer to work by Scott, Levine, Riesen, Denenberg, Harlow, Mason, and many others. We need human studies which closely parallel these animal studies. The few that we have, including the work of Held and White, suggest how much we have to gain from using approaches from the animal studies in our work on early human experience and later sequellae.

The co-chairmen of this symposium asked me to speak on current issues in research on early development. I chose to give only the briefest mention to what is clearly the dominant trend in our present research--investigation of the validity of Piaget's formulations about cognitive development--for I wished only to point out that this was but one instance, in a long line of such instances, of the way biological thinking has influenced our work as developmental psychologists. I did want to cite several other examples of the influence of contemporary biology on our field, calling your attention to current and promising work influenced by ethology, evolutionary biology, genetics, physiological psychology, comparative psychology, and electroencephalographic studies of brain-behavior relations. I see all of these as promising current innovations in our field.